

PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in or relating to Ball Bearings.

We, **COMPAGNIE D'APPLICATIONS MECANQUES**, a body corporate organised under the laws of France, of 42, rue Franklin, Ivry-Port (Seine), France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to a process of mounting or assembling ball bearings in which use is made of temporary shaped cages built up from strips of material adapted to be deformed which receive a suitable corrugated shape, so that when mounting the bearings, the said corrugated strips can be rapidly and easily deformed in order to accommodate and retain the balls correctly in their operative positions.

According to one of the preferred methods of carrying out the invention, the aforesaid process is characterised in that certain parts of the cage particularly the parts projecting between the balls, are previously to the assembly, shaped with a rather pronounced "M" section, the middle or central "V" in each "M" portion being pressed inwards after the cage has been put into position on the balls, so as to cause a permanent change in the shape of said parts and to complete the housings for the balls in order to retain same in their final positions.

The said process enables suitably shaped tools to be used for obtaining an accurate permanent change of shape in the "M" shaped loops or sections, the said tools being easily and rapidly centered on the middle or central "V" portions of the said loops.

Obviously it is sufficient that the points of the "V" portions in the "M" shaped separating loops in the strip should be exactly located and calibrated to obtain the automatic and correct distribution of the balls between their tracks when assembling the bearings, something which cannot be obtained by the hitherto known methods, particularly in case of the assembly of double row ball bearings, in which the bended parts of the bands holding the balls are located opposite each

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other and very close together and to the middle or central plane of the bearing.

In the case of such double row ball bearings, the process according to the invention enables the axial length of the bearings to be reduced to the minimum value enabling a satisfactory operation, and practically the distance between the middle or central planes of each of the tracks can be made equal to twice the radius of the balls, increased naturally by the working play and the play corresponding to the different distortions produced during operation under load of the bearing.

The accompanying drawing shows, by way of example, the invention applied to the assembly of a double row ball bearing.

In the said drawing:

Fig. 1 is a side view of a double row ball bearing of the radial type provided with a cage according to the invention.

Fig. 2 is a sectional view taken along the line A—A in Fig. 1.

Fig. 3 is a partial sectional view of the cage ready for the assembly.

Fig. 4 is a view similar to Fig. 3 but showing one of the final forms with which the cage can be shaped.

According to the invention, cages are used each composed of a corrugated strip of a material adapted to be deformed, and which has received the shape illustrated in Fig. 3. In this figure it will be seen that the loop-shaped part projecting between two balls 3 has a rather pronounced "M" section and therefore has a central or middle "V" portion as indicated at 2.

The cage thus prepared being placed on a row of balls, the point of each "V" is pressed inwards so as to open the "V" as shown in Fig. 4 and to permanently change the shape of the said loops. The latter thus assume a shape such that the cage is effectively retained in position on the balls.

The points of the "V" portions on the separating loops being exactly located and calibrated, and it being possible to center the tools used for flattening the said V portions rapidly and easily on the

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said points, the distribution of the balls is automatic and correct.

The axial dimension of the cage before the assembly being approximately equal to the final dimension, on account of the shape preliminary imparted to the corrugated strip it results that the axial length of double row ball bearings can be reduced to a minimum, since the adjacent parts of the two cages can almost contact each other after the shape has been permanently deformed, on account of the form previously given to the cages. In any case the loops forming the pockets for the balls are formed with a depth at most equal to the diameter of the balls.

The invention is applicable both to single row and to double row ball bearings as well as to bearings of both the axial and the radial type. The forms or sections illustrated in the drawing are only given as examples and other forms or sections could be used both before and after the strips are deformed without departing from the principles of the invention.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A process of mounting or assembling ball bearings according to which the balls are spaced relatively to one another by means of cages made of deformable material having alternate U shaped loops of a first type serving as pockets for the balls and U shaped loops of a second type intended to be deformed, characterised by the permanent enlargement of each U shaped loop of the second type so as to move closer together the inner portions of the loops of the first type and thus complete the housings for the balls.

2. A process of mounting or assembling ball bearings according to Claim 1, char-

acterised by the fact that the concave portions of the parts connecting the loops of the second type with the loops of the first type are moved towards the balls adjacent said connecting parts by permanently flattening the convex portions of the U shaped loops of the second type.

3. A process as claimed in Claim 1 or 2 characterised by the fact that the permanent change of shape of the "U" shaped loops of the second mentioned type is obtained by means of a forming tool or tools inserted through that face of the bearing towards which are turned the rounded portions of the balls pockets and the said tool or tools being centered on the bottoms of the loops of the second type.

4. A double row ball bearing having cages made in accordance with Claim 1 or 2, characterised by the fact that the distance between the middle or central planes of the two rolling tracks is practically equal to twice the radius of the balls, taking into account the play required for the operation of the bearing under load.

5. A partly finished cage for ball bearings assembled in accordance with the process claimed in Claim 1, characterised by the fact that the depth of the loops forming the pockets for the balls is at most equal to the diameter of the balls, the wings of the loops located between the pockets being sufficiently spaced from the latter to enable the forming tool or tools to be introduced through the face of the bearing towards which are turned the rounded portions of the ball pockets.

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COMPAGNIE D'APPLICATIONS
MECANIQUES,

Per Boulton, Wade & Tennant,
111/112, Hatton Garden, London, E.C. 1,
Chartered Patent Agents.

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[This Drawing is a reproduction of the Original on a reduced scale.]

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